WIPER BLADE FOR MOTOR VEHICLE WINDOWS

Prior Art

In wiper blades of the type indicated in the preamble of claim 1, the carrying element should ensure that the pressure exerted by the wiper arm to press the wiper blade against the windshield is distributed as uniformly as possible over the entire wipe field wiped by the wiper blade. Due to a corresponding curvature of the carrying element when it is not loaded - that is, when the wiper blade does not rest against the windshield - the ends of the wiping strip which rests in its entirety against the windshield during operation of the wiper blade are loaded toward the windshield by the carrying element which is now tensioned, even though the radii of curvature of spherically curved vehicle windshields change in every position of the wiper blade. Therefore, the curvature of the wiper blade must be somewhat greater than the greatest curvature measured in the wipe field of the windshield to be wiped. The carrying element accordingly replaces the elaborate carrying clip construction by two spring rails which are arranged in the wiping strip as is conventional practice in wiper blades.

The invention is based on a wiper blade according to the generic part of claim 1. In a known wiper blade of this type (DE 26 14 457 A1), the stop surfaces are arranged at shoulders that are connected integral with the carrying element and that belong to the apparatus for connecting the wiper blade to the driven wiper arm. These shoulders are accordingly made from the same material as the carrying element. This may possibly be of secondary importance provided that the carrying element is made from plastic and is therefore manufactured, along with the shoulders, by filling an appropriate mold. However, if the carrying element is produced from metal, there are two diametrically opposed requirements. Namely, on the one hand, the carrying element should have good spring characteristics, but the shoulders, on the other hand, should be easily bent out of the plane of the

carrying element by approximately 90 degrees and fixed in this position so that the loading occurring during operation between the wiper blade and wiper arm can be absorbed at the stop surfaces. These two requirements can scarcely be met in practice without disadvantageous compromises with respect to the selection of material.

In another known wiper blade (DE 12 47 161), the carrying element is provided with a connection device formed as a separate structural component part. This connection device is fixedly connected with the carrying element by means of rivets. However, the bore holes which are required in the carrying element for this purpose, the rivets being seated therein so as to be mechanically clamped, lead to an uncontrollable, and hence unwanted, change in the tensioning of the carrying element, so that satisfactory wiping results cannot be achieved.

Advantages of the Invention

In contrast, in the wiper blade constructed in accordance with the characterizing part of claim 1, a selection of material can be made with respect to the carrying element and the connection device which meets the respective demands of each structural component part. The two structural component parts are connected with one another economically in that one structural component part locks onto the other structural component part in a simple manner, wherein the catch means of one structural component part engage with the complementing catch means of the other structural component part, so that proper locking is carried out.

For reasons relating to manufacturing technique, it can be advantageous to arrange the catch means at the connection device.

According to a further development of the invention in which the catch means have at least one catch shoulder lying in a plane at least approximately parallel to the windshield surface and a complementing catch shoulder of the carrying element is associated with this catch shoulder, the forces occurring during the working movement of the wiper blade do not act in the direction of the locking forces, so that

a durable and dependable connection is ensured between the carrying element and connection device.

A precise arrangement of the connection device at the carrying element, viewed in the longitudinal direction of the carrying element, is achieved when the catch means have at least one retaining shoulder which is arranged transverse to the longitudinal extension of the carrying element and a complementing retaining shoulder of the carrying element is associated with this retaining shoulder.

The catch shoulder or retaining shoulder is advantageously arranged at the free end of a tongue which is arranged at the connection device and spring-loaded in the direction of the carrying element.

These catches can be realized without an especially elaborate construction in that the complementing catch shoulder or complementing retaining shoulder associated, respectively, with the catch shoulder and retaining shoulder is formed by a notch or cutout at the carrying element.

In this respect, a further simplification of the wiper blade construction is achieved in that the connection device is manufactured from a resilient or elastic plastic and the tongue is connected integral with the connection device.

When the connection device has two cheeks which are located at a distance from one another, extend transverse to the driving direction, are parallel to one another and oriented in planes vertical to the windshield, the catch means are advisably connected with the cheeks of the connection device.

A reliably operating construction of the connection device is provided in that the connection device has a substantially U-shaped cross section viewed transverse to the longitudinal extension of the wiper blade, wherein the base of the "U" contacts the carrying element and the legs of the "U" form the cheeks.

When each of the cheeks has a striplike extension extending beyond the base of the "U", wherein the distance between these striplike extensions, measured in the working direction of the wiper blade, is adapted to the width of the carrying element, measured in the working direction, in the mounted position, the connection device is guided precisely at the carrying element and the forces acting on the two

interconnected structural component parts during the operation of the wiper blade are safely transmitted without impairing the catch connection.

The fastening catch arrangement can be realized in a particularly simple manner in that at least one tongue which can be deflected out of the plane of the legs of the "U" is formed on at least one of the two U-legs of the connection device, this tongue extending into the region of the striplike extensions of the U-legs, wherein a catch hook is arranged with the catch shoulder facing the base of the "U" at the free end of the tongue located in the above-mentioned region, and the spacing between the catch shoulder and the U-base is adapted to the thickness of the carrying element. In this way, the underside of the carrying element remote of the connection device is utilized as a complementing catch shoulder. Additional constructions in this respect can be dispensed with.

In special cases, it may be advantageous in the case of a connection device having a base plate which can be placed on the upper side of the carrying element to arrange the catch means at this base plate. In this case, the catch means can be arranged at the free end of a tongue which is connected with the base plate and spring-loaded in the direction of the carrying element and can be formed by a projection which faces the carrying element and has the retaining shoulder.

In this case, an economical catch connection results when the complementing retaining shoulder facing the retaining shoulder is formed by a cutout at the carrying element.

A very good guidance of the connection device at the carrying element can be achieved according to a further construction of the invention in that the connection device has, on the side of its base plate facing the windshield, at least two guide strips extending in the direction of the longitudinal axis of the carrying element and having an L-shaped cross section, wherein the L-legs remote of the base plate are directed toward one another in a clawlike manner, wherein the distance between the other L-legs is adapted to the width of the carrying element and the distance between the first L-legs and the base plate are adapted to the thickness of the carrying element.

Other advantageous further developments and constructions of the invention are indicated in the following description and embodiment examples shown in the accompanying drawings.

Drawing

Figure 1 shows a side view of a wiper blade according to the invention;

Figure 2 shows a top view of the wiper blade according to Figure 1;

Figure 3 shows a side view of a connection device belonging to the wiper blade for a driven wiper arm;

Figure 4 is a bottom view of the connection device according to Figure 3;

Figure 5 is a top view of the connection device according to Figure 3;

Figure 6 shows a section through the connection device along line VI-VI in Figure 3;

Figure 7 shows a section through the connection device according to line VII-VII in Figure 3;

Figure 8 is an enlarged view showing a section according to line VIII-VIII in Figure 6 through the connection device, including a center piece of the carrying element;

Figure 9 is a side view of a different construction of the connection device in partial section along line IX-IX in Figure 11;

Figure 10 is a bottom view of the connection device according to Figure 9;

Figure 11 is a top view of the connection device according to Figure 9; and

Figure 12 shows a section through the connection device according to Figure 9 along line XII-XII.

Description of the Embodiment Example

A wiper blade 10 shown in Figures 1 and 2 has an elongated springing-elastic carrying element 12, at whose underside is fastened a rubber-elastic wiping strip 14. A connection device 16 by means of which the wiper blade 10 can be detachably connected with a driven wiper arm 18 is arranged at the upper side of the carrying element 12. A hook serving as complementing connection means is formed integral with the free end 20 of the wiper arm 18 and engages around an articulated pin 22 associated with the connection device 16 of the wiper blade. The wiper arm 18 and wiper blade 10 are secured to one another by securing means, known per se, which are constructed as an adapter and are not shown in more detail. The wiper arm 18, and therefore also the hook at the end 20, is loaded in the direction of arrow 24 (Figure 1) in the direction of the windshield to be wiped, whose wipe surface is shown in Figure 1 by a dash-dot line 26. Since the dash-dot line 26 represents the greatest curvature of the windshield surface, it can clearly be seen that the curvature of the wiper blade contacting the windshield by both ends is greater than the maximum windshield curvature. The wiper blade 10 contacts the windshield surface 26 by its wiping lip 28 along the entire length of the wiper blade 10 under contact pressing pressure (arrow 24). In this respect, a tension is formed in the springing-elastic carrying element 12 which provides for proper contact of the wiping strip 14 and its wiping lip 28 against the windshield over the entire length of the wiping strip 14, so that the wiping lip 18 always remains in contact with the windshield surface 26 when the wiper blade is moved in the direction of the double arrow 29 (Figure 2).

The connection means for fastening the connection device 16 to the carrying element 12 will first be described in the following with reference to Figures 3 to 8.

The connection device 16 arranged at the upper side of the carrying element 12 remote of the windshield surface 26 has a substantially U-shaped cross section.

It thus has a U-base 30 and two U-legs 32, 34 which are arranged at a distance from one another and are oriented vertical to the U-base 30, the wiper arm 18 being arranged between these two U-legs 32, 34 when the wiper blade is operated. This wiper arm 18 engages around the articulated pin 22 (Figure 7) by its hook-shaped free end 20. The wiper arm 18 fits between the U-legs 32, 34, so that it contacts the mutually facing cheeks 36 of the U-legs 30, 32 with its side surfaces which form counter-stops. In this way, the driving movement of the wiper arm 18 is transmitted to the wiper blade 10 in proper fashion. The connection device 16 is manufactured from an elastic plastic. As is shown especially in Figures 3 to 5, two deflectable tongues 38 which are arranged opposite one another in pairs are cut out at each U-leg 32 and 34 and are connected at one end with the U-legs 32 and 34, respectively, to form one piece. The U-legs 32, 34 continue in striplike extensions 40 at the side of the U-base 30 remote of the U-legs 32, 34. These striplike extensions 40 are located at a distance 42 from one another which is adapted to the width 44 of the carrying element 12 (Figure 8). This results in a flawless lateral guide for the connection device 16 at the carrying element 12 when this connection device 16 is placed on the carrying element 12 in accordance with Figures 1 and 2. The tongues 38 which are formed by removal of material extend from the U-legs 32, 34 to the region of the striplike extensions 40 (Figure 6). A catch tooth 46 which extends from one tongue 38 toward the other tongue of the same pair of tongues is arranged at each free end of the striplike extensions 40. Each catch tooth has a catch shoulder 48 which faces the underside of the U-base 30 of the connection device 16 and lies substantially in a plane parallel to the windshield to be wiped (Figure 7). The distance 50 between the catch shoulder 48 and the underside 31 of the U-base 30 facing this catch shoulder 48 is adapted to the thickness 52 of the carrying element 12 (Figure 7).

When the connection device 16 is placed on the carrying element 12 in the direction of arrow 54 in Figure 6, the side edges 13 of the carrying element 12 (Figure 2) press against stop bevels 56 of the catch teeth 46, so that the latter are temporarily deflected in the direction of arrows 58 (Figure 6) until the carrying element 12 has reached its mounting position shown in dash-dot lines in Figures 6

and 7. Since the connection device 16 and accordingly also the tongues 38 are made of elastic plastic, the tongues 38 subsequently spring back to their initial position in the opposite direction of arrows 58, wherein the catch shoulders 48 of the catch teeth 46 engage under the strip-shaped carrying element 12 and secure the latter at the connection device 16 in such a way that it is no longer possible for these two parts to separate from one another in the opposite direction of the arrow 54. Accordingly, the tongues 38, together with their catch teeth 46 and the catch shoulders 48 arranged at the latter, form catch means and the underside 49 of the carrying element 12 forms complementing catch means which cooperate with the catch means, so that the two parts are reliably fastened together. To ensure a reliable locking of the connection device 16 at the carrying element 12 in the longitudinal direction of the carrying element 12 as well, two tongues 38 are provided in the embodiment example with thickened portions 60 which are directed inward, that is, toward one another (Figures 6 and 8), wherein cutouts 62 with open edges which are arranged at the carrying element 12 are associated with these thickened portions 60. When the connection device 16 is properly oriented at the carrying element 12, the thickened portions 60 of the tongues 38 enter the cutouts 62 (Figure 8) when the tongues 38 spring back again into their initial position shown in Figure 6. Thus, together with the thickened portions 60, the cutouts 60 form a locking catch arrangement, wherein the surfaces 61 of the thickened portions 60 facing in the longitudinal direction of the carrying element 12 form retaining shoulders. The edges of the cutouts 62 facing these retaining shoulders form the complementing retaining shoulders of this locking catch arrangement.

Another embodiment form of the invention will now be described with reference to Figures 9 to 12. The connection device shown in a side view in Figure 9 has been provided with reference number 116. It likewise has a U-shaped cross section and is manufactured from springing-elastic material, preferably plastic. Thus, it likewise has a U-base 130 and accordingly also two U-legs 132 and 134 whose side faces which are directed toward one another form the cheeks 36. In this embodiment example also, the U-legs 132, 134 are guided beyond the U-base 130 serving as a base plate. These extensions are constructed as strips 136 which are

L-shaped in cross section. The L-legs 138 of the strips 136 are directed toward one another and are connected, by way of the other L-legs 140, with the U-shaped body of the connection device 116 so as to be integral therewith. The L-shaped strips 136 are constructed in such a way that the distance 142 between the L-legs 140 is adapted to the width 144 of the carrying element 12 (Figure 10). The distance 146 between one L-leg 138 and the underside 131 of the U-base 130 facing this L-leg 138 is adapted to the thickness 148 of the strip-shaped carrying element 12 (Figures 9 and 12). Accordingly, as is shown in Figures 9, 10 and 12, a slidelike guide results for the connection device 116 on the carrying element 12. Thus, the connection device 116 can be slid onto the carrying element in the longitudinal direction of the latter, wherein the L-shaped strips 136 together with the U-base 130 of the connection device 116 serving as a base plate form a guidance on all sides relative to the carrying element 12.

In order to lock the connection device 16 at the carrying element 12 in the longitudinal direction of the latter, the U-base 130 of the connection device 116 is provided with a cut out tongue 150 which can deflect in a resilient manner and which is connected in one piece with the connection device 116. A pin 152 which projects from the U-base toward the carrying element 12 is arranged at the free end of the tongue 150. The outer surface 154 of the pin 152 forms a retaining shoulder having a complementing retaining shoulder at the carrying element 12. In the embodiment example, this complementing retaining shoulder is formed by the wall surface of a bore hole 156 in the carrying element 12 (Figure 10). The arrangement between the pin 152 and the bore hole 156 is effected in such a way that the connection device 116 is in its proper mounting position when the pin 152 fits in the bore hole 156. The assembly of the connection device 116 at the carrying element 12 is described hereinafter with reference to Figures 9 and 10. The connection device 116 is slid onto the carrying element 12 in the longitudinal direction of the latter. The carrying element 12 lies in the slidelike guide which is formed by L-shaped strips 136. When the carrying element 12 is slid through the slide guide of the connection device 116, the tongue 150 is deflected in the direction of arrow 158 until the pin 152 releases the slide guide. After achieving the proper mounting position, the tongue 150 which

is now pretensioned springs back along with the pin 152 into its initial position shown in Figure 9, wherein the pin 152 enters the bore hole 156 associated with it. The outer surface 154 of the pin 152 now cooperates with the outer surface of the bore hole 156 in the manner of retaining shoulders and complementing retaining shoulders.

It will now be clear with reference to the preceding description that one of the structural component parts 12 and 16 which are connected with one another is provided with catch means 38, 46 or 150, 152 which can deflect in an elastic manner and which cooperate with complementing catch means 12 of the other structural component part 16 or 12 in such a way that the two structural component parts 12 and 16 are fastened together.

While the carrying element 12 in the embodiment examples is constructed in one piece, it may also be formed of a plurality of parts without exceeding the scope of the present invention.